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(60) Parent Application or Grant SILICON GAMING, INC. [/]; O. PETERSON, Kevin, D. [/]; O. PURCELL, Robert, E. ; O.		
(54) Title: GAMING MACHINE, WITH MULTIPLE PAYLINES AND RESPINNING REELS, AND METHOD OF PLAYING SAME (54) Titre: MACHINE A SOUS A PLUSIEURS LIGNES DE GAIN ET ROULEAUX DE DEFILEMENT, ET METHODE DE JEUE		
(57) Abstract <p>A gaming machine (10) with multiple paylines (30A, 30B, 30C) and respinning reels (28A, 28B, 28C) is provided. A player is afforded the opportunity to hold (17A, 17B, 17C) selected reels and to transfer symbols in those held reels to other reels in other reel sets. Wagers (18, 22, 24) can be made for selected amounts on selected paylines. The number of reels and reel sets may be increased or decreased to provide a player with a desired game setup.</p>		
(57) Abrégé <p>L'invention porte sur une machine (10) à sous dotée de plusieurs lignes de gain (30A, 30B, 30C) et de rouleaux (28A, 28B, 28C) de défilement. On offre au joueur l'opportunité de maintenir les rouleaux sélectionnés (17A, 17B, 17C) et de transférer les symboles de ces rouleaux vers d'autres rouleaux ou ensembles de rouleaux. Des paris (18, 22, 24) peuvent être faits pour des montants sélectionnés sur des lignes de gain sélectionnées. Le nombre de rouleaux et ensembles de rouleaux peut être augmenté ou réduit de sorte que le joueur puisse faire une mise au point désirée.</p>		

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Description

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**GAMING MACHINE WITH MULTIPLE PAYLINES AND
RESPINNING REELS, AND METHOD OF PLAYING SAME**

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Technical Field

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This invention relates to a gaming machine and method of playing the same and, more particularly, to a gaming machine and method which allows a player to hold selected gaming symbols, and to continue to play with the held symbols.

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Background Art

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Slot machines are well-known devices in the gaming industry. Typically, slot machines are computer controlled with video displays or are electro-mechanical devices having mechanically spinning reels controlled by a processor. The reels each have a plurality of different symbols or indicia. The machine will pay out based upon the alignment of the indicia on the reels along one or more pay lines. To play the machine, the player enters a wager in any fashion known in the art. Thereafter the player prompts the machine as by pressing a button or pulling a handle whereupon the electro-mechanical reels spin or the computer processor causes the video display to simulate spinning reels. When the slot machine is prompted by the player, a random number generator communicating with the processor selects an outcome from numerous possible winning and losing outcomes preset for the slot machine. The number of winning and losing outcomes may number in the thousands or millions. When the outcome has been selected, for electro-mechanical devices, the computer processor controls the reels to stop and align indicia on the reels along one or more paylines corresponding to the computer processor selected outcome. For video slot machines, the computer processor drives the video display to similarly display the reels stopping and to present an outcome

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along one or more paylines consistent with the outcome determined by the processor. If the symbols or indicia presented along the payline or paylines for the machine represent a winning outcome, the player is rewarded. Otherwise, the player loses his/her wager.

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5 Both the video and electro-mechanical slot machines include a single payline or may include multiple paylines such as three horizontal paylines or five paylines represented by the three horizontal paylines and two diagonal lines across three reels of the slot machine.

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In Hooker U.S. Patent 4,184,683, a slot machine apparatus was set forth which enabled a player to, on a first play, hold one or more of the symbols presented on the machine's payline for a second play. Thus, the held symbol can be carried over and form part of the combination on the subsequent play of the game.

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U.S. Patent No. 5,823,873 to Moody discloses a method of playing an electronic video poker game. The method of this invention involves a card game in which at least two rows of cards are dealt to a player, the player makes a wager for each row of cards, and then one row of cards are dealt face up. The player may then select none, one or more of the face up cards from the first row to be held, and those held cards are then duplicated in the remaining rows. Replacement cards for the non-selected cards are then dealt into the first row, and the other remaining rows. Various modifications can be made to this basic method as described therein.

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The prior art gaming machines have several drawbacks. First, the player has only one opportunity per play to obtain a specific outcome. Thus for example, if the player obtains two jackpot symbols on the payline, but requires three to obtain a jackpot, the player has no opportunity to have another try at obtaining that third symbol. Although the Hooker and Moody

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patents provide the opportunity to hold or carry over symbols from one play to another, they are also both limited in terms of how a wager must be placed, and how a player chooses other betting options. In short, these two references do not provide a player the opportunity to control many aspects of the games being played as compared to the invention described below. Thus, there is a need to provide a player with multiple opportunities to obtain a winning outcome, and greater flexibility in wagering options.

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Disclosure of the Invention

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The gaming machine and method of this invention incorporate the use of multiple paylines and respinning reels providing a player the opportunity to hold selected symbols, and to have those held symbols played in another phase of the overall game. Structurally, the gaming machine is simply any well-known electro-mechanical slot machine, or a slot machine which has a video display simulating an electro-mechanical slot machine. The components making up the machine may be the same as any well-known prior art machine, for example, the video display, the computer processor which controls play of the game, and the components which allow a player to enter wagers and to be paid for winning outcomes. The computer processor allows a player to initiate play once a wager is made. Gaming symbols are then displayed in an initial display along a plurality of longitudinally aligned reels corresponding to laterally aligned reel sets. The player is afforded the opportunity to hold one or more gaming symbols appearing in a first or home reel set. Those held gaming symbols are then duplicated, transferred, or copied to the corresponding longitudinally aligned reels in the other remaining reel sets. The player then reactivates the machine which produces another set of symbols in a final display which replaces the symbols not held in the first

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reel set, and to cause gaming symbols to appear in any remaining reels of the remaining reel sets. As further discussed below, the player is provided the opportunity to make wagers on selected paylines of selected amounts. Other features are provided to enhance the player's ability to interact in play of a game on the machine.

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Brief Description of the Drawings

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Figure 1 is a perspective view of a gaming device incorporating the present invention;

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Figure 2 shows one embodiment of the present invention in an enlarged partial front elevation of Figure 1 displaying the initial presentation of symbols upon initiation of play of a game;

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Figure 3 is a partial front elevation like Figure 2, but showing a final outcome for the play of the game;

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Figure 4 shows another embodiment of the invention in an enlarged front elevation of a device similar to Figure 1, the further embodiment illustrated at an initial display of symbols in a game;

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Figure 5 is a partial front elevation like Figure 4, but showing a partial outcome during the play of the game;

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Figure 6 is a partial front elevation like Figure 4, but showing the final outcome obtained for the play of the game;

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Figure 7 is a partial front elevation which shows a further embodiment of the present invention in a device similar to Figures 2 and 4, this further embodiment illustrated at a partial outcome for play of a game;

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Figure 8 is a partial front elevation which shows the device of Figure 7 having a final outcome; and

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Figure 9 is a partial front elevation which shows yet a further embodiment of the invention in a device similar to the previous embodiments and illustrated at a final outcome for play of a game.

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Best Mode for Carrying Out the Invention

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Turning to Figure 1, a device 10 according to the present invention is shown in the form of a gaming device which has a housing 11 including a computer controller 12 for controlling the play of the game as well as for driving a video display 13. While the device 10 hereinafter described in various embodiments is directed to a device which includes a video display 13, it is to be understood that the present invention could be applied to electro-mechanical reel-type slot machines as well. Further, while the device 10 as shown in Figures 1 and 2 is directed to a three reel presentation for a slot machine, it is to be understood that any number of reels such as four or five reels could be used for the play of the game. Figure 1 shows other standard elements of a gaming device which may be incorporated the present invention. Specifically, device 10 may further include a power supply 14 which provides power to the computer processor 12 and the other electrical components. A payout display 15 may be provided to indicate the machine payout for various winning combinations. A coin tray 16 is provided to catch a player's winnings, or to catch coins if a player decides to cash out. The computer controller or processor 12 controls the symbols shown on the video display, and otherwise controls all of the functions of the gaming machine in terms of how the player interfaces with the gaming machine, creating visual display outputs for viewing by the player, paying out winnings to the player, as well understood in the art.

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For the player to control the play of the machine, various buttons are provided on the housing 11. Alternatively, the machine could be controlled through touch screen technology in a manner well known in the art. With reference now to Figure 2, the device 10 includes three hold buttons 17A-17C which allows a player to hold, from an initial presentation, none, some, one, two, three, or more of the reels of the device 10 as hereinafter described. Also included is a bet one credit button 18 by which a player may bet one accumulated credit, a cash out button 20 by which the player may cash out accumulated credits in the device 10, a bet one credit per payline button 22 (i.e., if the device is a three payline device, three credits would be wagered by depressing button 22) and a max bet button 24. The operation of these buttons is well known in the art. By depressing the bet one credit button 18, the player can bet one credit at a time. Similarly, by depressing bet one credit per payline button 22 the player can wager one credit per payline, and by depressing the max bet button 24, the player can play the maximum amount for each payline permitted by the device 10. Repeated activation of button 22 allows the player to wager the number of credits desired up to the maximum amount permitted for each payline.

As illustrated, the device 10 displays three reel sets 26A-26C horizontally, each reel set including three reels 28A-28C. Associated with each reel set 26A-26C is a corresponding payline 30A-30C which dictates the manner in which the gaming symbols or indicia must be aligned in order for the player to be eligible for obtaining a winning group of symbols displayed on a particular reel set.

Each of the reels 28A-28C for each reel set 26A-26C may display one or a plurality of symbols or blanks. When the device 10 is initiated for play, the computer controller 12 for the device 10 simulates rotation of the reels

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28A-28C which eventually stop to align gaming symbols along the respective paylines 30A-30C. The gaming symbols aligned along the paylines 30A-30C define the outcomes of the corresponding reel sets 26A-26C. As described above, the combination of indicia along the paylines defines one of a universe of winning and losing outcomes for the machine. This universe may include thousands or millions of outcomes, only some of which are winning outcomes. For winning outcomes, the player receives a reward. A pay schedule is provided for winning outcomes which, in accordance with the probabilities of the winning outcomes occurring, defines an overall payout schedule for the device 10. This pay schedule may be viewed on display 15. The device 10 also includes a means for accepting a wager such as a cash validator 23, a coin slot, or means for receiving a debit or credit card, such as a card validator, 25.

To play a game on the machine, the player enters a wager. As wagers are entered, the reel sets 26A-26C are activated. For example, if the player only bets one credit or one coin, only reel set 26A, the "home" reel set, will be activated. As the player puts in additional coins, the second and third reel sets 26B and 26C are activated. The device 10 may define a maximum amount which can be wagered for each reel set 26A-26C. For purposes of illustration, it will be assumed that each reel set 26A-26C has a maximum wager of three units or credits each. Thus if a player wagers three units, each of the reel sets 26A-26C will have one unit wagered thereon. If a player wagers six units, each reel set will have two credits wagered on thereon. If a player wagers five units, reel sets 26A and 26B will have two units wagered thereon whereas reel set 26C will have only one unit wagered thereon.

Associated with each payline 30A-30C may be a corresponding indicator 32A-32C which displays the number of units wagered on each reel set. For

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purposes of illustration, as shown in Figure 2, it will be assumed that the player has wagered the maximum of three units for each reel set 26A-26C.

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After the player has made his/her wager, the device 10 is initialized. Upon entering a maximum wager, the device 10 may be automatically initialized. If the player wagers less than the maximum wager, the player would depress a spin button 34 to initiate play. As shown in Figure 2, upon initiation, a partial first outcome has been obtained for the first reel set 26A, shown as, for the first reel 28A, a "7," for the second reel 28B, a "bar" symbol, and for the third reel 28C, another "7." The reels 28A-28C for the second and third reel sets 26B and 26C may be displayed as continuing to spin as suggested in Figure 2.

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Upon this initial display, the player has the option of holding none through all three of the reels 28A-28C of the first reel set 26A by depressing the corresponding hold buttons 17A-17C. As illustrated in the example of Figure 2, the player has opted to hold reels 28A and 28C of the first reel set 26A in anticipation of obtaining a "7 7 7" final outcome. The "held" state may be visually shown by highlighting some portion of the visual display. As shown in Figure 2, a letter "H" 31 may appear on the visual display directly underneath the corresponding reel held.

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In response to holding the reels 28A and 28C of the first reel set 26A, the partial outcome represented by the held reels 28A and 28C is replicated, reproduced or transferred by the controller to the second and third reel sets 26B and 26C as shown in Figure 3. Thus, the symbols in reels 28A and 28C from the initial display (Figure 2) are held and transferred to the reels 28A and 28C for the second and third reel sets 26B and 26C. Thereafter, the player prompts the device 10, as by depressing the spin button 34, to complete the play of the game. If the player selects a held reel again (by pressing buttons

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17A-17C) before prompting the device to complete play of the game, the "hold" state will be canceled so that particular hold reel will be placed in the "unheld state," thereby being subject to activation when the player prompts the device to complete the game. Of course, the player has the option of holding none of the reels which would make them all subject to activation when the player prompts the machine again. Figure 3 illustrates the completion of play. For the first reel set 26A, the player has obtained a "bar" symbol for reel 28B. Thus the outcome for the first reel set 26A is "7 bar 7." For the second reel set 26B, the player has obtained for the second reel 28B, a "cherry" symbol. For the third reel set 26C, the player has obtained for the second reel 28B a "bar" symbol. Thus, the player has obtained three outcomes, one for each reel set 26A-26C. The player's wagers for each reel set 26A-26C are resolved separately based upon those symbols or indicia associated with the paylines 30A-30C. For any reel set 26A-26C obtaining a winning outcome, the player is paid based upon the wager of three units.

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As can be appreciated, the player is provided, according to the device 10 of the present invention, with the opportunity to hold one or more reels 28A-28C, to have those held reels copied, reproduced or transferred to other reel sets 26B-26C and to complete play by replacing the initially displayed symbols obtained from the reels 28A-28C which were not held. If the player obtained a winning outcome from the initial display and chose to hold all three reels 28A-28C, that winning outcome would be replicated for each of the reel sets 26A-26C and the player would be paid for three winning outcomes. Alternatively, the production of a winning outcome on the initial display could result in automatic replication of that outcome in the other reel sets without the player having to press hold buttons 17A-17C.

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Turning to Figure 4, a further embodiment of the device 10 according to the present invention is shown. Those elements bearing the same reference numerals are as those described with reference to the embodiment of Figures 2 and 3.

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According to the embodiment of Figures 4-6, the reel sets 26A-26C may include a different number of reels. For example, the first reel set 26A includes three reels 28A-28C. The second reel set 26B includes four reels 28A-28D and the third reel set 26C includes five reels 28A-28E. As before, the initial display is directed to the first reel set 26A and the player has obtained an initial outcome of "7 bar 7." The player holds the first and third reels 28A and 28C which, as shown in Figure 5, have been replicated into the second and third reel sets 26B and 26C. The player, in a manner described above, prompts the completion of play whereupon the device 10 completes the second reel set 26B as by selecting, for the second reel 28B, a "cherry" symbol and for the reel 28D, a "bar" symbol. As shown in Figure 5, the replicated held symbols from the initial display of the first reel set 26A have been also replicated into the third reel set 26C. With reference to Figure 6, the processor also completes the outcome for the third reel set 26C as by selecting, for the reels 28B, a "7," for reel 28D, a "wild" symbol, and for reel 28E, a "wild" symbol. As before, the player is paid based upon the outcome for each reel set 26A-26C. An advantage of the embodiment of Figures 4-6 is that the addition of the reels 28D and 28E in the second and third reel sets 26B and 26C, allow the machine to provide for a different payout schedule, such as by providing for higher payouts or additional winning combinations. Thus, players are further encouraged to play all three reel sets 26A-26C.

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Turning to Figures 7 and 8, yet another embodiment of the device 10 according to the present invention is shown. Like elements bear the same reference numerals.

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According to this embodiment, each of the reel sets 26A-26C is provided with multiple paylines shown as five paylines 30A-30E which include three horizontal paylines 30A-30C as well as two diagonal paylines 30D and 30E. For clarity of Figures 7 and 8, only one set of reference numbers is shown of 30A-30E for reel sets 26A-26C. According to this embodiment, if a player chooses to play all paylines of all the reel sets 26A-26C at, for example, one unit per payline, the player would wager 15 units. If each payline of the next reel set has a maximum allowable wager of 3 units, the player would wager 45 units to play the maximum wager for all paylines 30A-30E of all the reel sets 26A-26C.

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With reference to Figure 7, like the embodiments described above, the player makes his/her wager and initiates the device 10 to obtain an initial display for the first reel set 26A as illustrated. The other reel sets, 26B and 26C, may be displayed as continuing to spin. According to the embodiment shown in Figure 7, the player has elected to hold the first reel 28A of the first reel set 26A, as indicated by the presence of the "held" indicator 31. The held reel 28A is replicated or copied to the second and third reel sets 26B and 26C, as also shown in Figure 7. In the case of Figure 7, holding a reel results in transferring three symbols to the other reel sets since each reel has the three vertically aligned symbols. The player thereafter prompts the completion of play whereupon the reels 28B and 28C of the first reel set 26A which were not held are replaced with replacement displays, and the reels 28B and 28C of the second and third reel sets 26B and 26C also display an outcome. Accordingly the displays for all reel sets 26A-26C are completed. As shown

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in Figure 8, for the first reel set 26A, the player has obtained on a diagonal payline an outcome of a wild symbol 36 and two "bar" symbols which could constitute a winning outcome. For the second reel set 26B, the player has obtained two 7s on a diagonal line and a wild symbol 36 which could 5 constitute another winning outcome, has obtained on a horizontal payline two wild symbols 36 and a "bar" which could constitute another winning outcome, and has obtained on another horizontal payline three "7s" which could 10 constitute yet another winning outcome. For the third reel set 26C, the player has obtained three wild symbols 36 on a diagonal payline as well as two "7s" 15 and a wild symbol 36 on a horizontal payline which could constitute two additional winning outcomes. Based upon the winning outcomes obtained 20 from each reel set 26A-26C, the player receives a specified reward:

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Like the second embodiment of the device described above with 30 reference to Figures 4-6, additional reels may be provided for each reel set 15 26A-26C. Further, it should be understood that additional reel sets could be provided for the device 10 resulting in two, three, four, or more additional reel sets as desired.

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Turning to Figure 9, yet another embodiment of the device 10 according to the present invention is shown. Like elements bear the same 40 reference numerals. According to this embodiment, distinct payline wagering buttons 40 can be provided for each payline or each reel set. The payline buttons 40 allow a player to make independent wagers on any payline or any 45 reel set. For example, the player in Figure 9 has chosen to place a wager of three credits for the upper payline, one credit for the middle payline, and two 50 credits for the lower payline or home reel set. Wagering in this manner is achieved first by pressing the particular payline button 40 corresponding to the desired payline, and then selecting credit payline button 42 which allows the

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player to place the number of credits as a wager for that particular payline. The player then moves to the next desired payline button 40, and then depresses credit payline button 42 for the amount to be wagered for that particular payline. By this independent wagering, a player is afforded the opportunity to place a wager in a completely independent and selective manner. In lieu of touch screen buttons, payline buttons 40 could be incorporated as standard push buttons. Conversely, payline button 42 could also be incorporated as a touch screen button. The previous embodiments describe that a player wagering multiple units or credits would result in credits being applied to a set order of paylines. Means may also be provided which would allow a player to designate the order in which wagers should be applied to desired paylines. For example, the embodiment of Figure 9 further includes wagering sequence buttons 44 which indicate the order in which wagers should be applied. As shown in Figure 9, the upper payline has been designated as the first payline for which wagers should be applied, the middle payline has been selected as the second payline for which wagers should be applied, and the bottom or home reel set has been designated as the third payline for which wagers should be applied. Each of the wagering sequence buttons may be pressed according to a scroll type display showing the available sequence in which paylines may be designated. The embodiment of Figure 9 may also incorporate each of the functions previously described with regard to the other embodiments. For example, the player may be afforded the option of holding none through all three of the reels 28A-28C by depressing the corresponding hold buttons 17A-17C. For this game, the player has previously held reels 28A and 28C which both have a "bar." Figure 9 illustrates the final outcome for this particular game played by the player. As shown, the upper payline has "bar 7 bar" in which the player placed a wager

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of three credits. The middle payline shows "bar bar bar" wherein the player placed a wager of one credit, and the lower payline shows "bar 7 bar" wherein the player placed a wager of two credits. The middle payline could constitute a winning outcome wherein the player was paid the published amount.

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5 In addition to the features discussed above, there are other features which may be incorporated to enhance play of the machines. For example, when a player decides to hold a particular reel set, the video display 13 may provide other visual highlights to assist the player in observing that that reel set has been held, such as highlighting the hold buttons to show "held," or 10 highlighting special borders (not shown) around the reels which have been held. The reels which have not been held may also be distinguished from those which have already been held by providing a visual covering, non-paying symbols, or may simply appear blank. Similarly, paylines which have not been wagered on may appear blank, or contain non-paying symbols, or be 15 provided with a visual covering.

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This invention has been described in detail with reference to particular 25 embodiments, but it will be understood that various modifications can be effected within the spirit and scope of the claimed invention.

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Claims

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CLAIMS**What is claimed is:**

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1. In a gaming machine comprising a display showing a plurality of gaming symbols representative of possible winning combinations in designated paylines, the display having a plurality of longitudinally aligned reels and a plurality of laterally aligned reel sets, said symbols being displayed in corresponding reels of each reel set, and a computer processor for controlling play of a game on the machine, the improvement comprising:

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means for activating play of said machine to produce a first set of symbols in an initial display;

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means for holding selected symbols displayed in corresponding reels of a first reel set, and means for transferring said selected symbols to appear in corresponding reels of remaining reel sets;

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means for reactivating play of said machine to produce a second set of symbols in a final display which replace said first symbols not held; and

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means for determining winning combinations of displayed symbols from said held symbols and said second set of symbols in said final display.

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2. A machine, as claimed in claim 1, further including:

means for selectively determining a wager for said designated

paylines.

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3. A machine, as claimed in claim 1, further including:

means for selectively determining a sequence of wagers to be

applied to said designated paylines.

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4. A machine, as claimed in claim 1, further including:
means for displaying the amount of wager for each payline.

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5. A machine, as claimed in claim 1, further including:
means for selectively and independently determining a wager
for each payline.

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6. A machine, as claimed in claim 1, wherein:
there are an equal number of reels in each reel set.

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7. A machine, as claimed in claim 1, wherein:
there are a different number of reels in at least one reel set in
comparison to remaining reel sets.

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8. A machine, as claimed in claim 1, wherein:
there are a plurality of gaming symbols displayed in each reel,
each gaming symbol being alignable with a corresponding payline.

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9. A method of playing a gaming machine comprising the steps of:
providing a gaming machine which produces a visual display of
a plurality of gaming symbols which appear in a plurality of longitudinally
aligned reels of a corresponding plurality of laterally aligned reel sets;
providing a player the opportunity to activate the gaming
machine to cause the gaming symbols to appear in the corresponding reels of
a first reel set in an initial display;

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providing the player the opportunity to hold selected symbols appearing in reels of the first reel set, and to duplicate the held symbols in corresponding reels of the remaining reel sets; and

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providing the player the opportunity to reactivate the gaming machine causing new gaming symbols to be generated by the machine to replace the gaming symbols of the initial display not previously held, and causing gaming symbols to appear in any remaining reels of said remaining reel set thus producing a final display.

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10. A method, as claimed in claim 9, further including the step of: affording the player an option to place wagers on selected paylines.

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11. A method, as claimed in claim 9, further including the step of: affording the player an option to place wagers of different amounts for selected paylines.

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12. A method, as claimed in claim 9, further including the step of: affording the player an option to place wagers of the same amounts for selected paylines.

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13. A method, as claimed in claim 9, further including the step of: affording the player an option to place wagers based on a preselected sequence of paylines.

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14. A method, as claimed in claim 9, further including the step of:

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affording the player an option to place wagers based on selected paylines on a sequence determined by the player.

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15. A method, as claimed in claim 9, further including the step of: affording the player an option to place wagers based on a maximum bet.

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16. A method, as claimed in claim 9, further including the step of: affording the player an option to place wagers based on a minimum bet.

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17. A method, as claimed in claim 9, further including the step of: affording the player an option to de-select held symbols prior to the step of providing the player the opportunity to reactivate the gaming machine.

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18. A method, as claimed in claim 9, further including the step of: arranging an equal number of reels in each reel set.

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19. A method, as claimed in claim 9, further including the step of: arranging a different number of reels in at least one reel set in comparison to remaining reel sets.

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45. A method, as claimed in claim 9, further including the step of: arranging a plurality of gaming symbols to be displayed in each reel, each gaming symbol being alignable with a corresponding payline.

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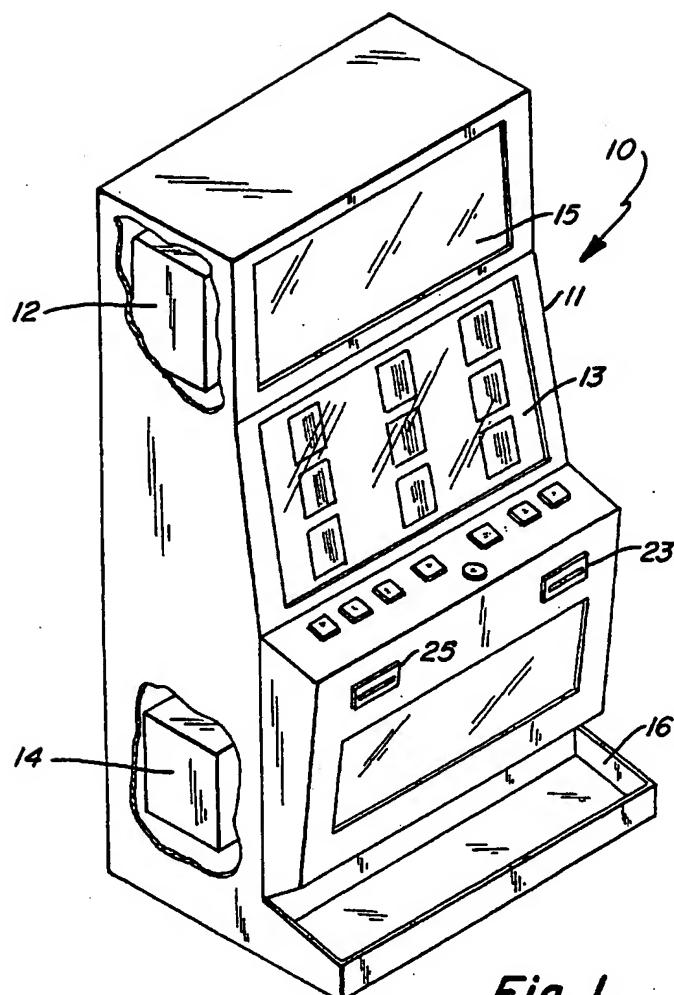


Fig-1

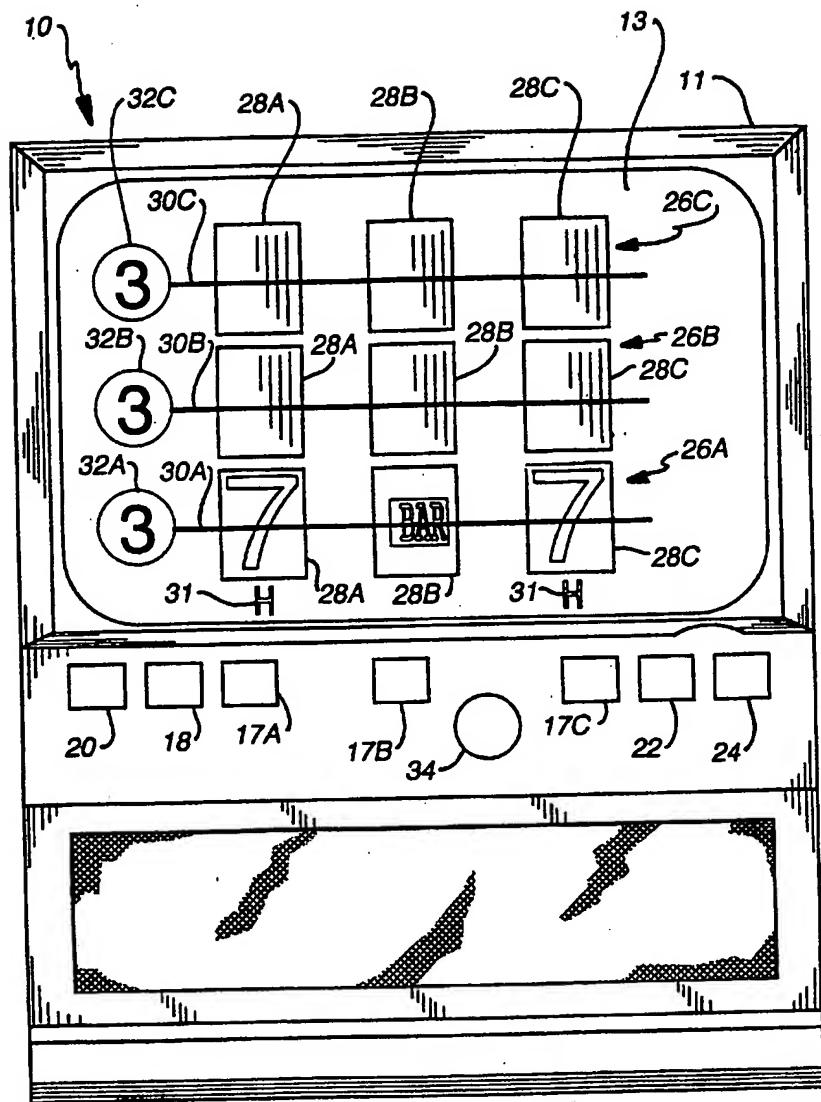


Fig. 2

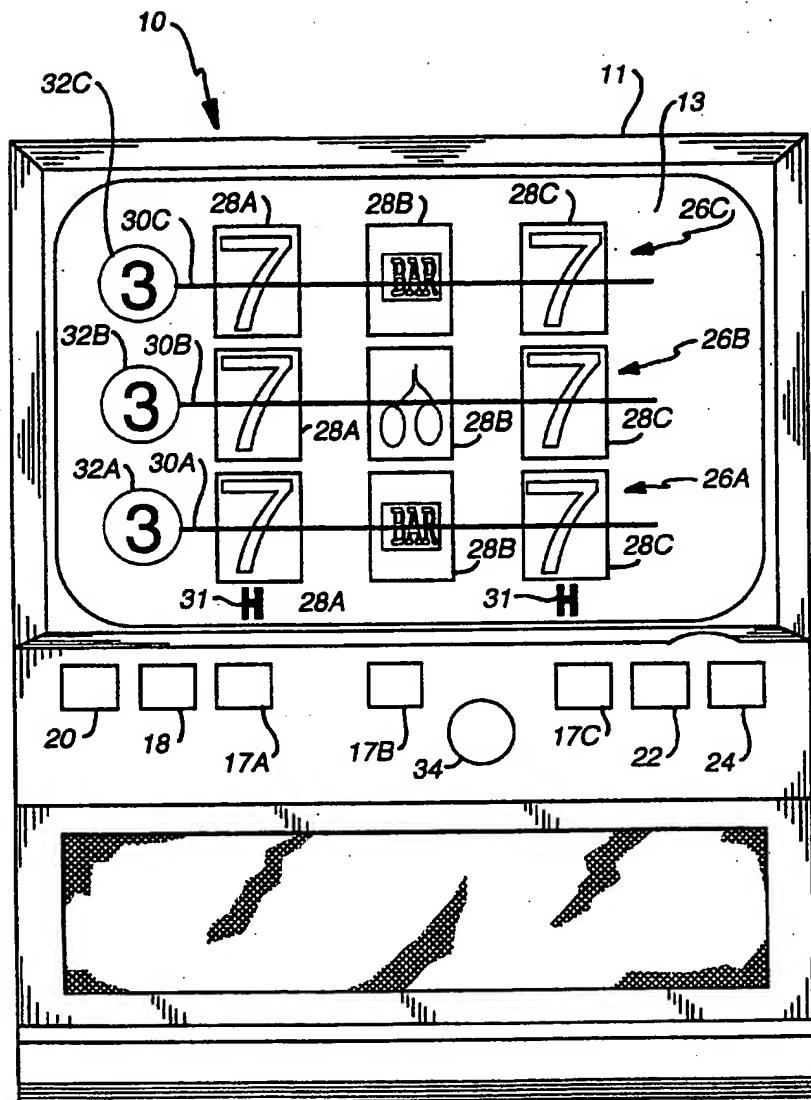


Fig. 3

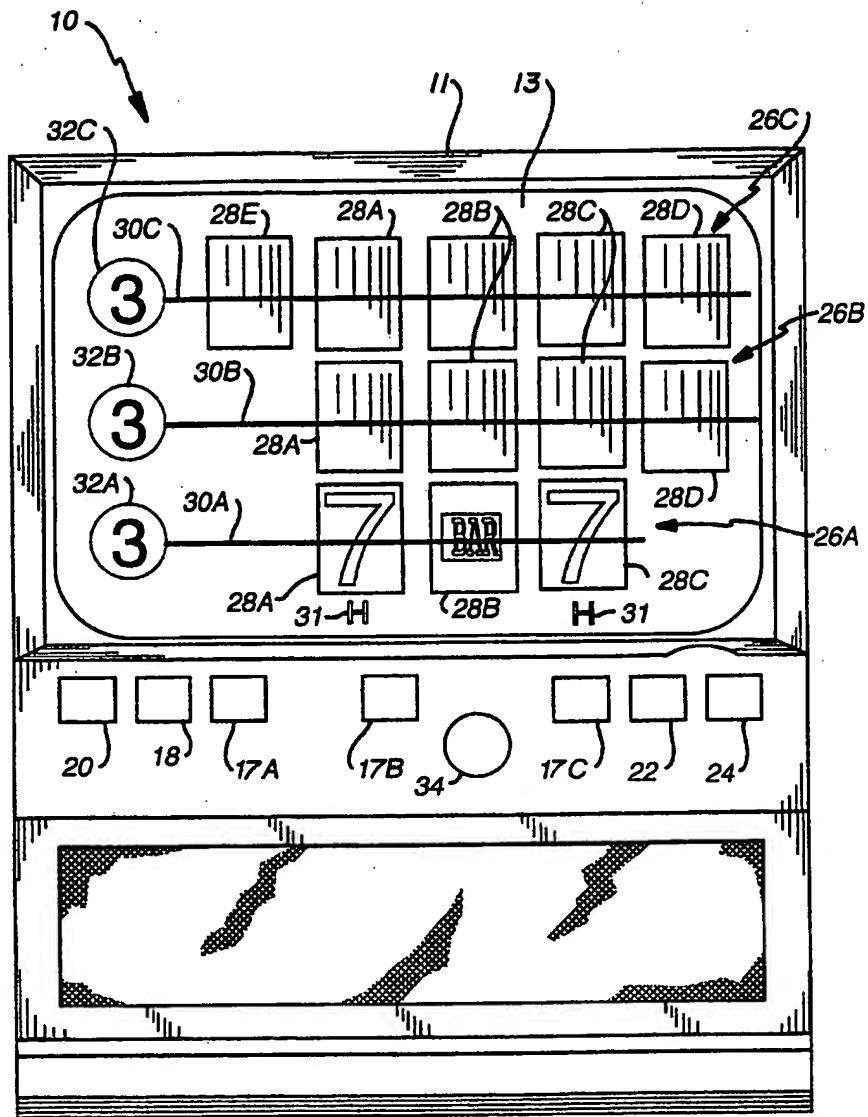


Fig. 4

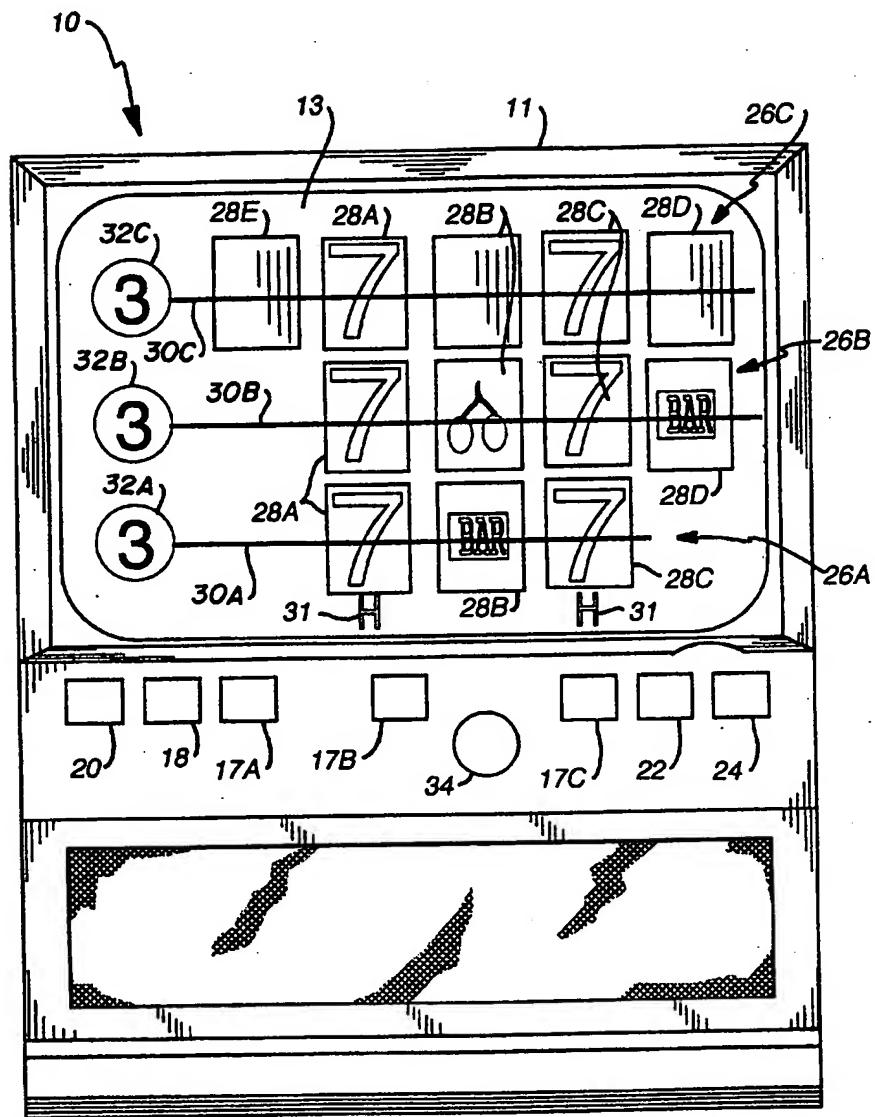


Fig. 5

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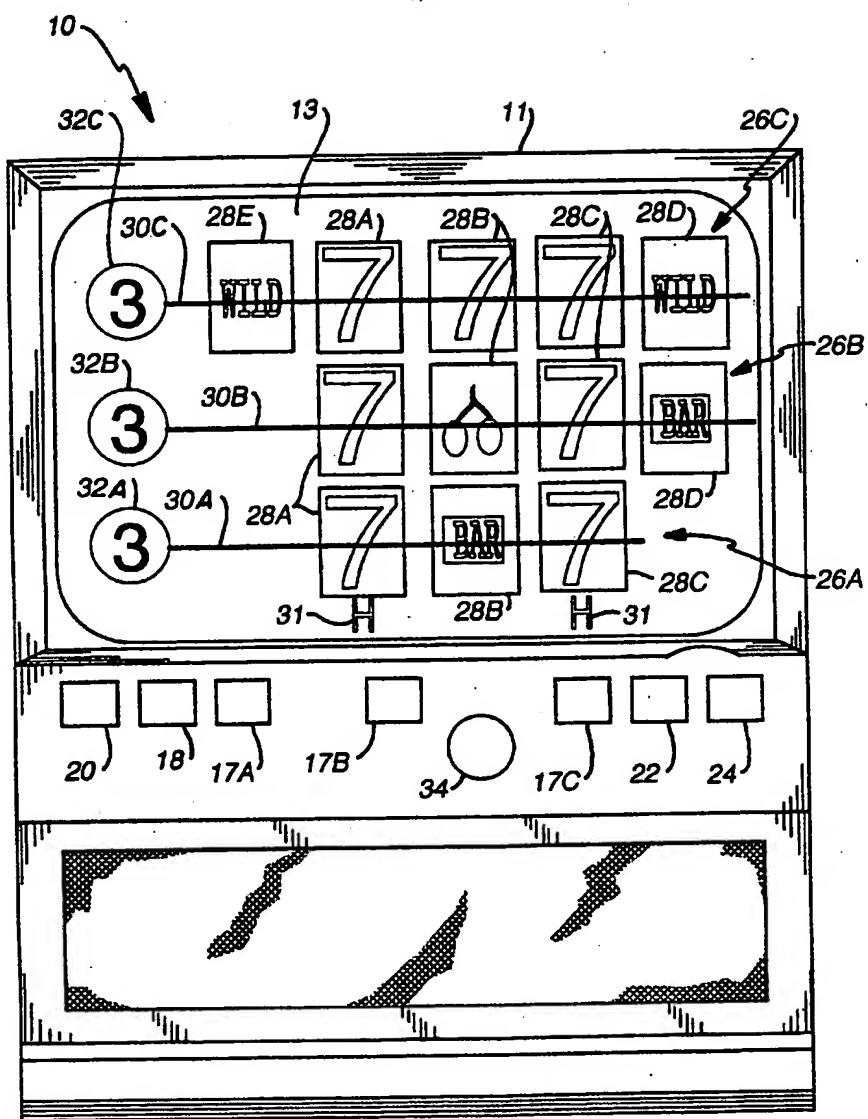


Fig. 6

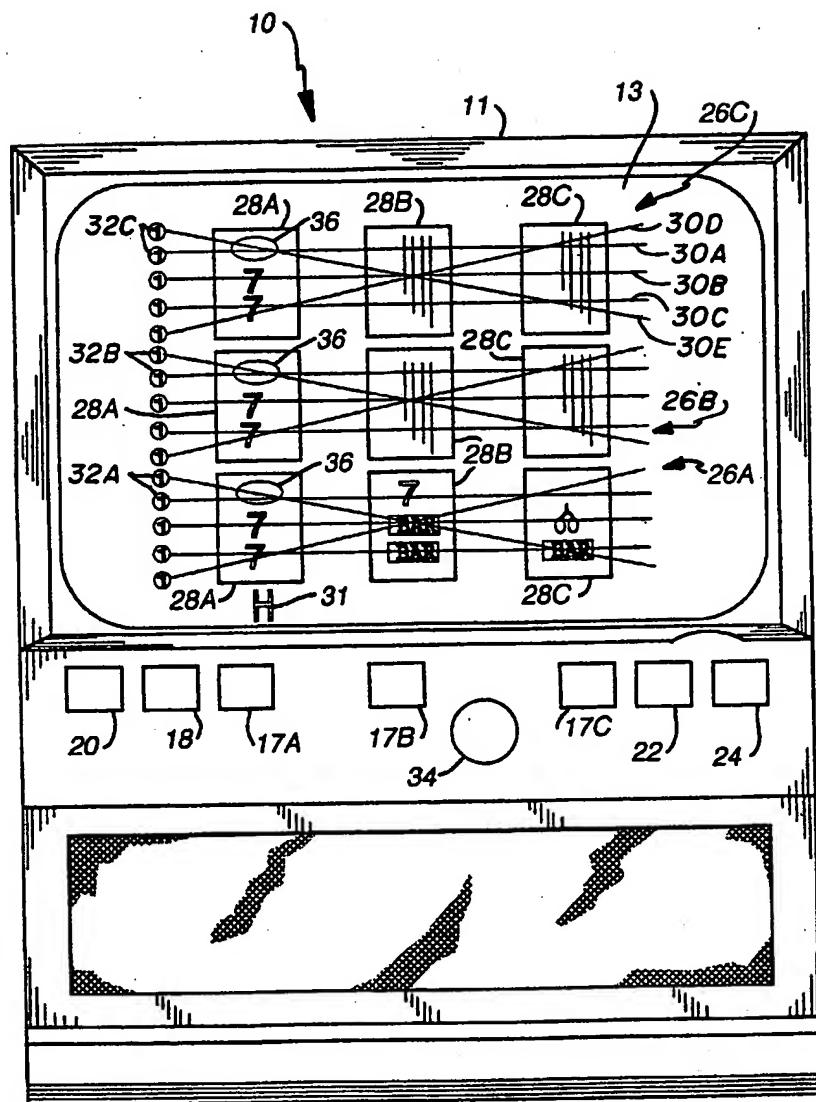


Fig. 7

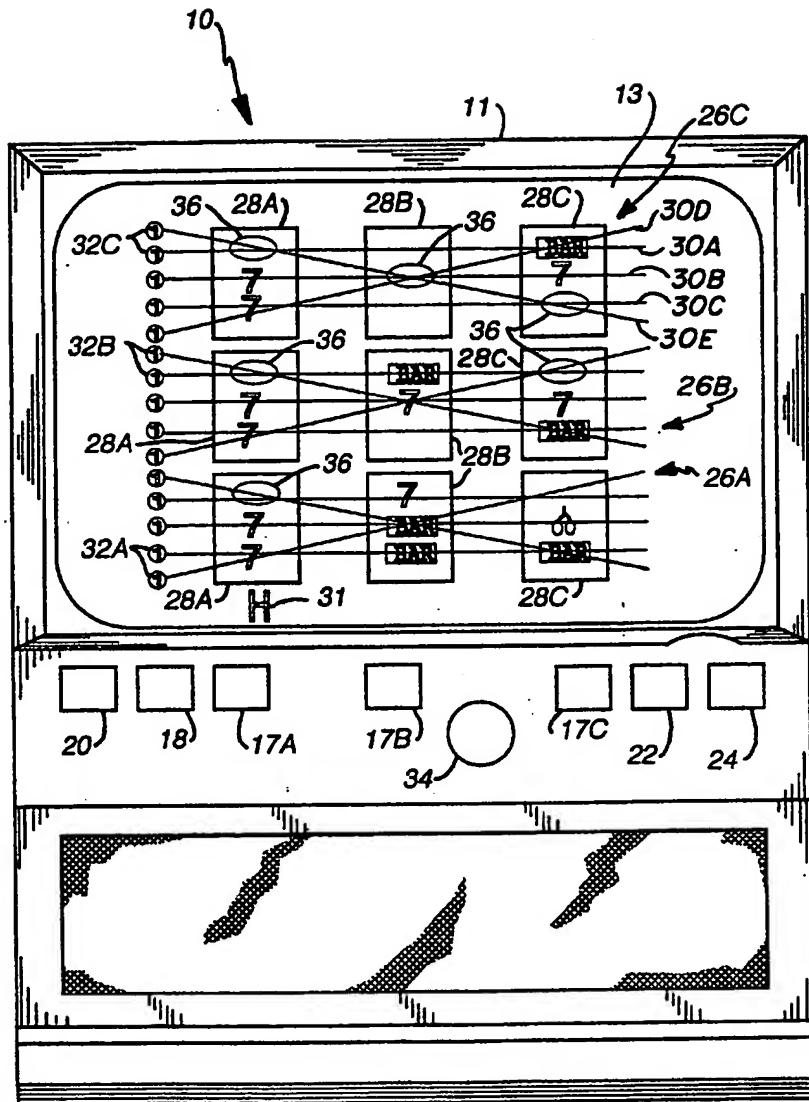


Fig. 8

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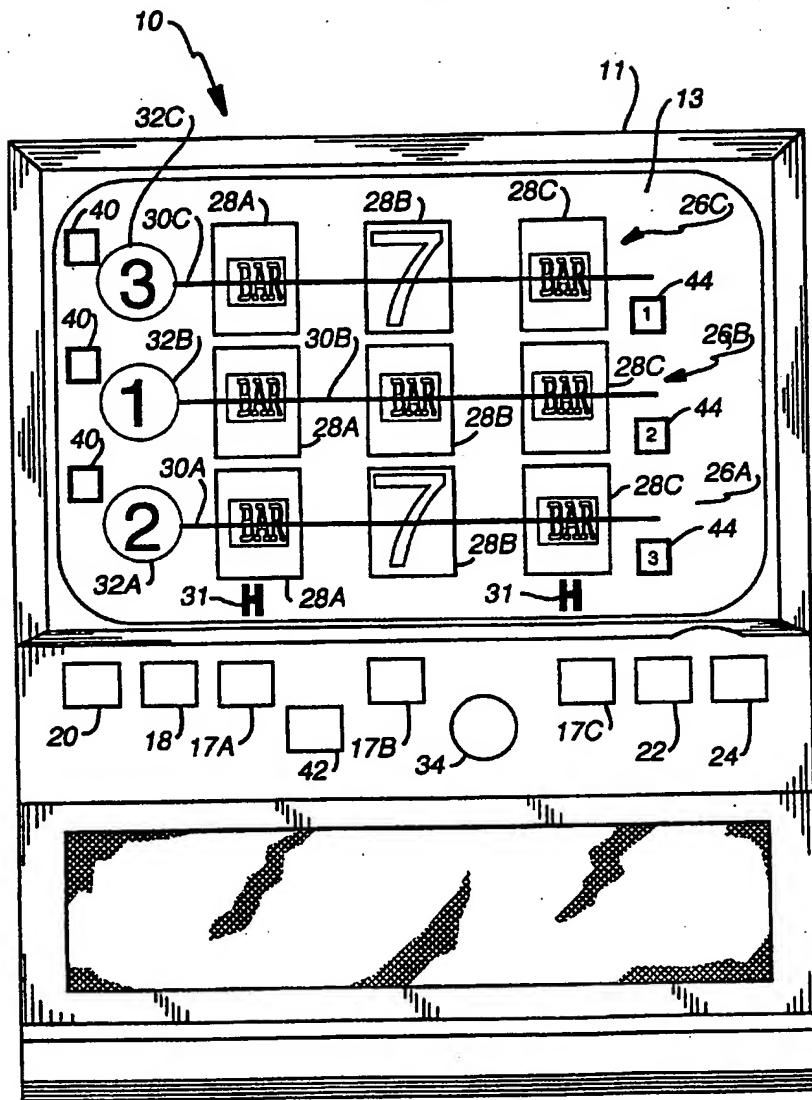


Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/23011

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(6) :A63F 9/24 US CL :463/20 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 463/17, 18, 19, 20, 23; 273/459, 460		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) APS		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,704,835 A (DIETZ, II) 06 JANUARY 1998, columns 1-5.	1-20
X	US 5,823,873 A (MOODY) 20 OCTOBER 1998, columns 1-4.	1-20
A	US 5,647,798 A (FALCIGLIA) 15 JULY 1997.	1-20
A	US 5,630,753 A (FUCHS) 20 MAY 1997.	1-20
A	US 4,184,683 A (HOOKER) 22 JANUARY 1980.	1-20
A	US 5,356,140 A (DABROWSKI ET AL) 18 OCTOBER 1994.	1-20
A	US 3,733,075 A (HOOKER ET AL) 15 MAY 1973.	1-20
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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Date of the actual completion of the international search 06 DECEMBER 1999	Date of mailing of the international search report 31 JAN 2000	
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer  JOHN PARADISO Telephone No. (703) 308-2825	

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